DEPARTMENT OF THE NAVAL SERVICE

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responsible for the disease, but a Bacillus (B. salmonis pestis). The Bacillus alone brought about the death of fish, but not the Saprolegnia alone. The latter was able to grow in tissues already invaded by the Bacillus. The Bacillus grew in sea water, but the Saprolegnia did not. Salmon affected by the disease while in sult water would therefore not show any fungus until after arriving in fresh water. Patterson states that the cold season is more favourable for the growth of the Bacillus and Malloch (1910, p. 117) states that the colder the weather the worse the disease becomes. But Patterson's experiments merely show that the Bacillus grows better at G° C. (32° F.) than at 37° C. (98.6° F.), whereas at room temperature (60° F. ?) t'a growth was very much more rapid than at O° C.

In the case of the disease in the Miramichi river, Mr. Sheasgreen has stated that the condition of the fish in the pond improved rapidly during the latter half of October and at the same time the number of diseased fish taken in the traps decreased. The lower temperature may have been responsible for this, either by improving the condition of the fish or by decreasing the rate of spread of the infection.

For eradicating the disease our only hope, and that a slender one, is to systematically remove all dead and diseased fish as soon as discovered. Patterson recommends that they be burned and *not buried*, since the organisms survive in the dead fish and may be carried again into the strcams. Unless due to some undiscovered temporary factor, the disease is practically certain to appear again.

Whatever organism may be most responsible for the disease, the latter being an affection of the skin, will be influenced by other organisms as well, and there will also be a number of contributing factors, the chief of which will be those that lower the general vitality of the fish. In the case of the salmon retained for spawning purposes, an effort should be made in the future to improve the conditions in the ponds, particularly with regard to renewal of the water and the attainment of the most suitable temperature, so that the fish will be affected as little as possible. If the disease reappears, experiments should be instituted to determine the conditions best adapted to prevent its spreading.

The use of the fish for spawning purposes raises the question of the possible effect of the disease on the eggs or on the next generation. The Deputy Minister informs me under date of April 6, 1916, that in three hatcheries, supplied from the Miramichi retaining pond, the loss had already reached a figure of from 42 per cent to 61 per cent of the original number of eggs. It seems probable that many infected fish had recovered, as maintained by Mr. Sheasgreen, and that these gave eggs of greatly lowered vitality. The fish stripped were all in good condition, and precautions were taken to prevent any infection reaching the eggs from the exterior of the fish or from the pond.

What would be the result if some of the infection did reach the eggs? The Saprolegnia is known to attack fish eggs, but it is at least probable that this occurs only when the eggs are of low vitality. Also Saprolegnia spores are so widely distributed as to be present in the water in the hatching troughs in any case, although those from the fish may belong to a more virulent strain.

It is improbable that the bacteria, which may have a causal relation to the disease in the salmon, will attack the salmon eggs. Plehn (1911) found that *Bacterium salmonicida*, which produces furunculosis in the brown trout (*Salmo fario*) attacked neither the eggs, the alcvins, nor the fry of the trout, but did attack the yearlings. It is therefore quite unlikely that the disease can be transmitted through the fry and by that means be carried to the streams in which fry from Miramichi eggs may be planted. It is possible, however, that it might be carried in the water used for shipping the eggs or fry.

It is very desirable that during a future season other rivers should be investigated. It has been claimed that in the rivers of Great Britain the salmon discase was present in a sporadic form previous to the outbreak in 1877.